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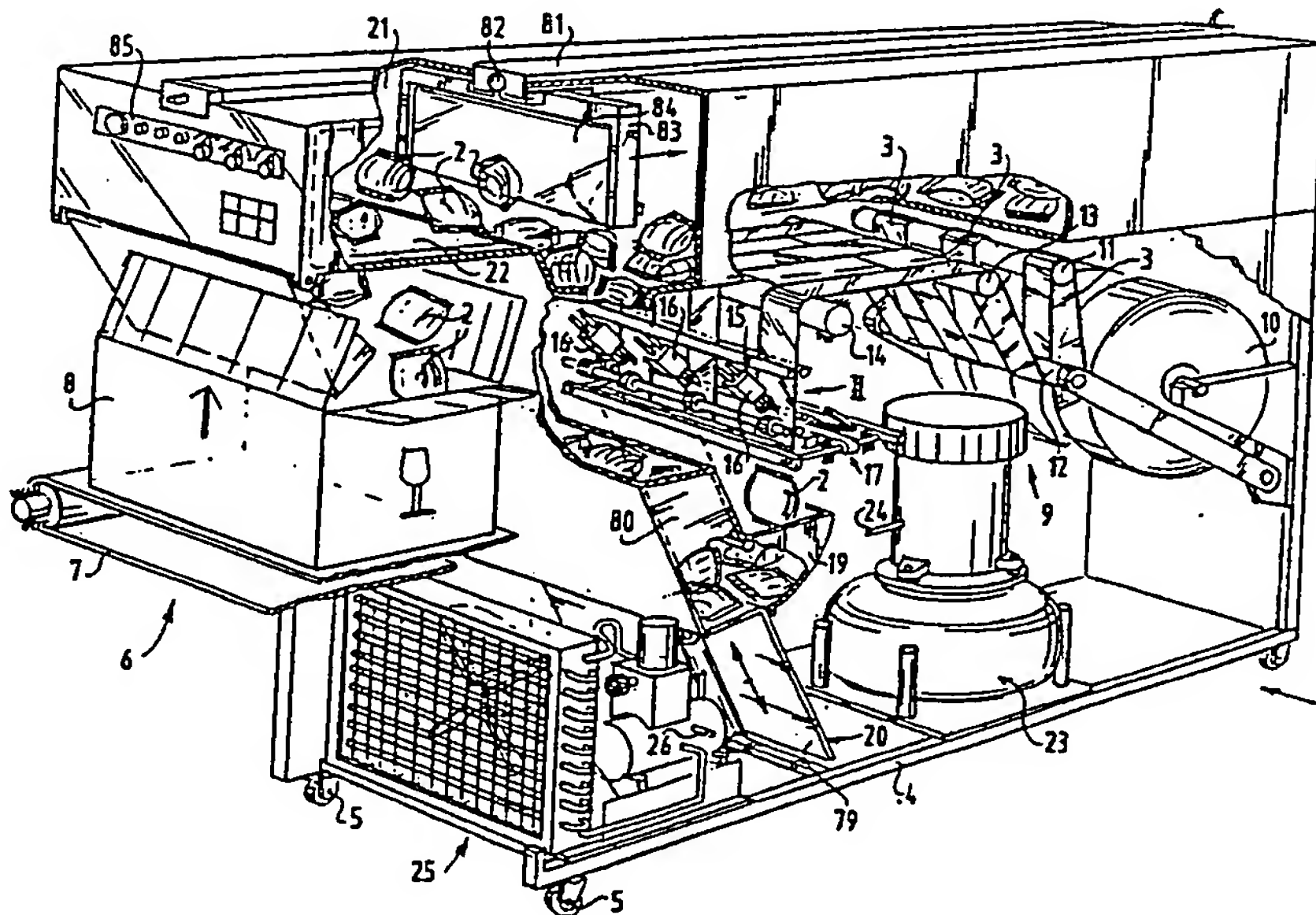
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(54) Title: DEVICE FOR PRODUCING A CUSHION FILLED WITH A GASEOUS MEDIUM



(57) Abstract

The invention relates to a device for manufacturing a cushion filled with gaseous medium, comprising: at least one supply unit for a tubular, medium-tight strip; at least one filling unit which comprises an injector for injecting the gaseous medium into the strip; a welding unit with two welding members disposed at a mutual distance for arranging transversely in the strip a double weld seam at the position of an opening formed by the injector; means for transporting the strip through the welding unit; and a cooling unit with an outlet for cooled medium, which outlet is connected to the injector.

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DEVICE FOR PRODUCING A CUSHION
FILLED WITH A GASEOUS MEDIUM

The present invention relates to a device for manufacturing a cushion filled with gaseous medium. The invention relates more particularly to a device for manufacturing a cushion filled with gaseous medium and having a relatively high cushion production speed.

In the packaging industry there is increasing opposition to the use of plastic chips as filling material. Such chips have a relatively serious environmental impact, while after use these plastic chips moreover retain a high volume.

The invention has for its object to provide a device with which a different type of filling material can be provided for the packaging industry, namely cushions which are filled with gaseous medium, in particular with air. For such an application it is however necessary for the device to be able to manufacture large numbers of cushions at a relatively high production rate.

It is known for example to fill cushions with liquid hair shampoo. Shampoo is herein poured into a tubular plastic and the cushion filled with shampoo is converted into a finished product by means of welding.

The device used herein cannot however be applied for filling cushions with a gaseous medium, since the cushions formed therein are very limp and therefore unsuitable as filling material in the packaging industry.

The present invention is based on the insight that it is possible to manufacture relatively robust cushions filled with gaseous medium if, during filling of the tubular medium-tight strip, a cooled gaseous medium is used. The invention therefore provides a device for manufacturing a cushion filled with a gaseous medium, comprising:

at least one supply unit for a tubular, medium-tight strip;

at least one filling unit which comprises an injector
for injecting the gaseous medium into the strip;
a welding unit with two welding members disposed at a
mutual distance for arranging transversely in the strip
5 a double weld seam at the position of an opening formed
by the injector;
means for transporting the strip through the welding
unit; and
a cooling unit with an outlet for cooled medium, which
10 outlet is connected to the injector.

Because the gaseous medium, for example air, is in-
jected into the tubular strip at a temperature of for example
-10°C and, following on directly therefrom, the cushion
acquires its finished form by arranging of a double weld
15 seam, the gas will expand when warming up to room temperature
and a relatively strong inflated cushion will be formed. An
additional advantage herein is that by making use of
considerably cooled gaseous medium a good weld seam can be
formed because the considerably cooled gas rapidly cools the
20 softened strip material at the position of the weld seam and
thereby causes it to acquire its strength.

If however the cushions must be manufactured at a
relatively high production speed, it is not certain in some
conditions that the weld seam will rapidly acquire sufficient
25 strength during bulging of the cushion despite the splitting
forces generated by the bulging.

A sufficient production speed can nevertheless be
obtained or maintained, if in further preference the cooling
unit is provided as preferred with a coolant outlet which is
30 connected to the welding members. It has been found namely
that by cooling the welding members the softened strip
material is at the higher temperature level for a shorter
time and a strong, cooled weld seam can therefore be created
more rapidly.

35 For filling with a pre-adjustable amount of gaseous
material, it is further recommended that the filling unit
comprises a pair of pinch rollers located upstream of the
injector. This avoids gaseous medium flowing away in

uncontrolled manner towards the supplied part of the medium-tight strip lying upstream.

In order to ensure as far as possible that during the piercing of the strip only one of the layers is pierced and the layer located thereunder does not suffer any damage, it is further recommended that the filling unit comprises a support member situated on the other side of the strip in relation to the injector. When the strip is pierced with the injector the mutual positions are thus ensured and adjustable such that a piercing of both layers of the strip is avoided. For optimal piercing of the strip it is further recommended that the path of movement of the injector lies in a plane tangentially of the support member. The first strip layer is thus pierced and is pressed away in a bulge by the filling, while the other strip layer cannot be touched by the injector which was approaching tangentially.

An optimal construction of the welding unit is obtained when both welding members are arranged in a cooled welding housing that is provided with an inlet connected to the coolant outlet.

Although a chain of cushions filled with air can be formed, it is however recommended that the cushions are separated from one another. It is thus possible to arrange the cushions in any desired manner and density as filling material in a packaging. It is preferred for this purpose that the device be provided with a cutting unit for cutting a cushion formed with the gaseous medium from the strip.

For easy use of the cushions as filling material in a packaging, it is further recommended that the device is provided with a supply chamber connecting onto the cutting unit and having a bottom outlet for stored cushions. It is thus only necessary to place the packaging under the bottom outlet of the device and to then cause cushions to come out via this bottom outlet. For an optimum construction of the device it is recommended that the supply chamber is situated at a higher level than the cutting unit and connects thereto via an intermediate conveyor. A relatively compact device thus results which can even be embodied as a mobile device and which can be disposed temporarily for example at a

location where packagings have to be filled with filling material in the form of cushions manufactured with the device according to the invention.

It will be apparent that with the device according to the invention it is possible to make more than one cushion filled with gaseous medium in one operational step. Two, three or more tubular strips can for instance be processed simultaneously into cushions.

Mentioned and other features of the device according to the invention will be further elucidated hereinafter in the light of an embodiment given only by way of example, while reference is made to the annexed drawing.

In the drawing:

figure 1 shows a perspective partly broken away view of a device according to the invention;

figure 2 shows on a larger scale detail II of figure 1; and

figures 3-6 show views according to the arrow III in figure 2 for the various operative positions of the filling unit and the welding unit.

Figure 1 shows a device 1 according to the invention for manufacturing cushions 2 formed with gaseous medium from strips 3 of tubular, medium-tight, in this case airtight, material such as a polyester or a polyethylene foil. The strips 3 can have a mutually differing width. The device comprises a frame 4 which is placed on castor wheels 5 and which is thereby mobile and can be placed in a position near a filling location 6 on a conveyor 7, so that the packaging 8 can be filled with cushions 2.

The device 1 comprises a feed unit 9 for a strip 3 of tubular foil which is wound onto a reel 10 and supplied via a number of reversing rollers 11-14 to the respective filling unit 15. As shown in figure 1, cushions 2 can be formed simultaneously from three strips 3.

The filling unit 15 comprises an injector 16.

Following on from the filling unit 15 is a multiple welding unit 17 in which is also incorporated a cutting unit 18. The severed cushions filled with gaseous medium fall into a container 19 of a conveyor 20 forming part of the

transporting means, with which the cushions 2 are carried up into a supply chamber 21, wherefrom the cushions 2 can be discharged via a bottom outlet 22.

The device 1 further comprises a compressor 23 for operating diverse transporting means, and is connected further via a conduit 24 to a cooling unit 25, so that cooled air can be supplied to the injector 16. The cooling unit 25 further comprises an outlet 26 which is connected to an inlet 27 of the welding unit 17 so that the welding unit 17 can be cooled.

Figure 2 shows in more detail the structure of the injector 16, the welding unit 17 and the cutting unit 18.

The strip 3 is supplied over the reversing roller 14 and then passes through a pair of pinch rollers 28, 29 which lie upstream of the point at which the injector 16 pierces the strip 3. The strip 3 is transported using two pairs of transport wheels 30 and 31 which make contact with both sides of the strip 3 and transport the strip 3 downward. The pairs of transport rollers 30 and 31 are arranged on shafts 32 and 33 which make contact via gear wheels 34 and 35 and which are driven by a motor 37 via a belt 36.

The injector 16 comprises a base plate 40 guided on the frame 4 via a square pin 38 in a horizontal slotted hole 39, to which plate is connected a housing 42 rotatable round a pin 41. The housing is pressed against an eccentric stop 44 by a spring 43. In the housing 42 is arranged a cylinder 46 provided with a compressed air inlet 45 and having a piston 47 under bias of a spring 48. The piston 47 is provided with a piston rod 49 which is connected via a coupling piece 50 to an injection tube 52 which is provided with a bevelled cutting tip 51 and which is guided in the housing 42 and provided with an inlet 53 for cooled medium which is connected to the outlet 26 of the cooling unit 25.

The welding unit 17 comprises a stationary profile 54 and two beams 56 and 57 connected thereto via guide rods 55. Arranged between profile 54 and beam 57 are two shears 58 and 59 which are controllable by a cylinder 60 operating on compressed air. By operating the cylinder 60, whereby the

shears 58 and 59 move apart, the beams 56 and 57 are moved toward one another.

The beam 57 carries a welding housing 61 which is provided with the inlet 47 for coolant. In the welding housing 61 are arranged two welding members 62 and 63 for arranging two weld seams 64 and 65 transversely through the strip 3.

As shown in figure 3, each welding member 62, 63 comprises a resilient pressing strip 66 which co-acts with a pressure bar 67 which is arranged on the beam 56. Each welding member further comprises one or more filaments 68.

Further arranged between the two pressure bars 67 is a cutting blade 69 which belongs to the cutting unit 18.

Because the pressure bars 67 and the cutting blade 69 are received in a frame 70 which is guided on pins 71 and supports with springs 72 against the beam 56, optimal co-action between pressing strip 66 and pressure bar 67 and good severing with the cutting blade 69 are realized.

Figure 3 shows the situation wherein the injection tube 52 with its cutting tip 51 approaches the strip 3 in a path of movement according to the arrow 73 determined by the guiding in the housing 16 and in a plane tangential to a support member, in this case a support rod 74.

As shown in figure 4, the strip 3 is pierced and the strip 3 filled with cold air between the two strip layers 75 and 76. The injection tube 52 is herein displaced from the dashed line position to the full line position according to the arrow 77 through rotation round the pin 41 counter to the action of the spring 43.

Figure 5 shows the situation wherein the injection tube 52 is retracted and, using the transport rollers 31, the filled part of the strip still provided with an opening 78 is moved downward, while simultaneously the beams 56 and 57 are moved toward each other by actuating the cylinder 60, whereby as shown in figure 6 the weld seams 64, 65 are formed and a finished cushion 2 is formed by cutting with the cutting blade 69.

The weld seams 64 and 65 are arranged such that the opening 78 either lies between both weld seams 64, 65 or is

incorporated in one of the two weld seams. The finished cushions 2 fall in the container 19 and are carried up with a transport pusher 79 via a shaft 80 into a supply chamber 21, in which a frame 83 with a tiltable flap 84 is guided on a rail 81 controlled by a piston 82. By moving the frame 83 and operating the flap 84 cushions 2 are discharged through the bottom outlet 22 into the packaging 8.

The control of the diverse transporting means is possible from the control panel 85.

10 It will be apparent that the device according to the invention is suitable for manufacturing from one or more strips 3 cushions 2 which, depending on the strip width, can have different shapes. By cooling the air for injecting and by cooling the welding units large quantities of cushions 2
15 tautly filled with medium can be manufactured very rapidly.

CLAIMS

1. Device for manufacturing a cushion filled with gaseous medium, comprising:

at least one supply unit for a tubular, medium-tight strip;

5 at least one filling unit which comprises an injector for injecting the gaseous medium into the strip;

a welding unit with two welding members disposed at a mutual distance for arranging transversely in the strip a double weld seam at the position of an opening formed
10 by the injector;

means for transporting the strip through the welding unit; and

a cooling unit with an outlet for cooled medium, which outlet is connected to the injector.

15 2. Device as claimed in claim 1, wherein the cooling unit is provided with a coolant outlet which is connected to the welding members.

3. Device as claimed in claim 1 or 2, wherein the filling unit comprises a pair of pinch rollers located
20 upstream of the injector.

4. Device as claimed in claims 1-3, wherein the filling unit comprises a support member situated on the other side of the strip in relation to the injector.

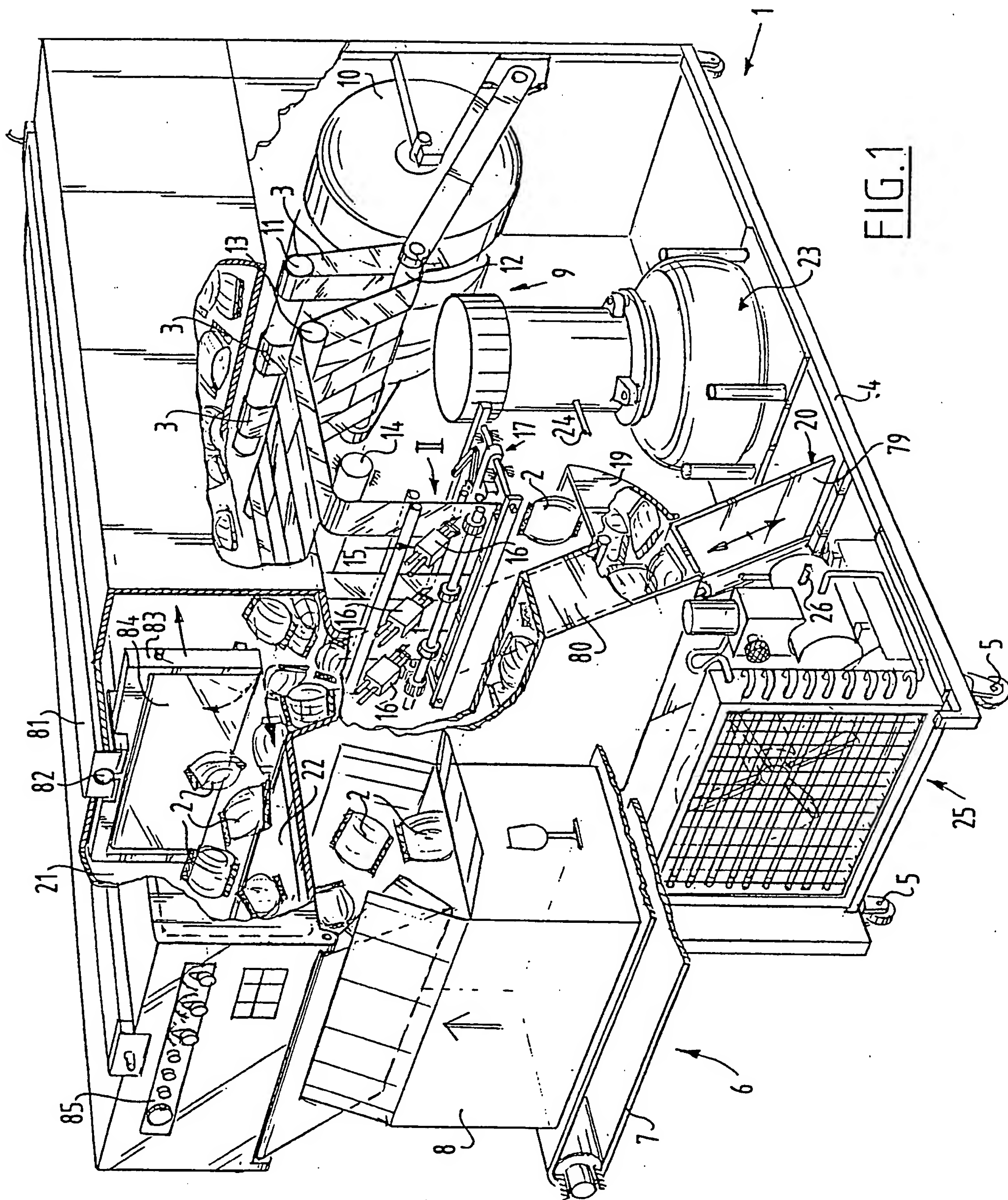
5. Device as claimed in claim 4, wherein the path of
25 movement of the injector lies in a plane tangentially of the support member.

6. Device as claimed in claims 2-5, wherein both welding members are arranged in a cooled welding housing which is provided with an inlet connected to the coolant
30 outlet.

7. Device as claimed in claims 1-6, provided with a cutting unit for cutting from the strip a cushion formed with the gaseous medium.

8. Device as claimed in claim 7, provided with a supply chamber connecting onto the cutting unit and having a bottom outlet for stored cushions.

9. Device as claimed in claim 8, wherein the supply
5 chamber is located at a higher level than the cutting unit and connects thereto via an intermediate conveyor.



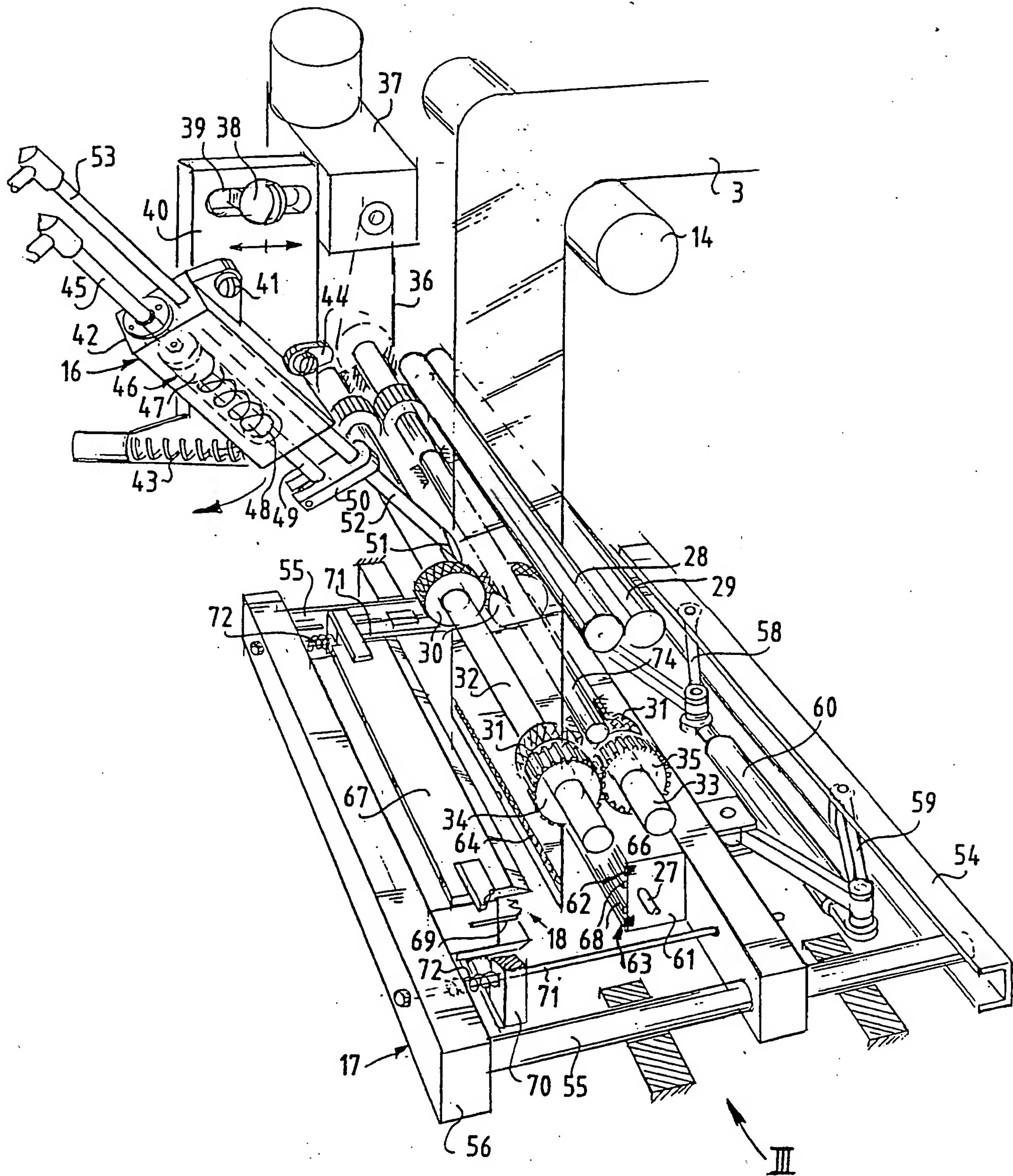
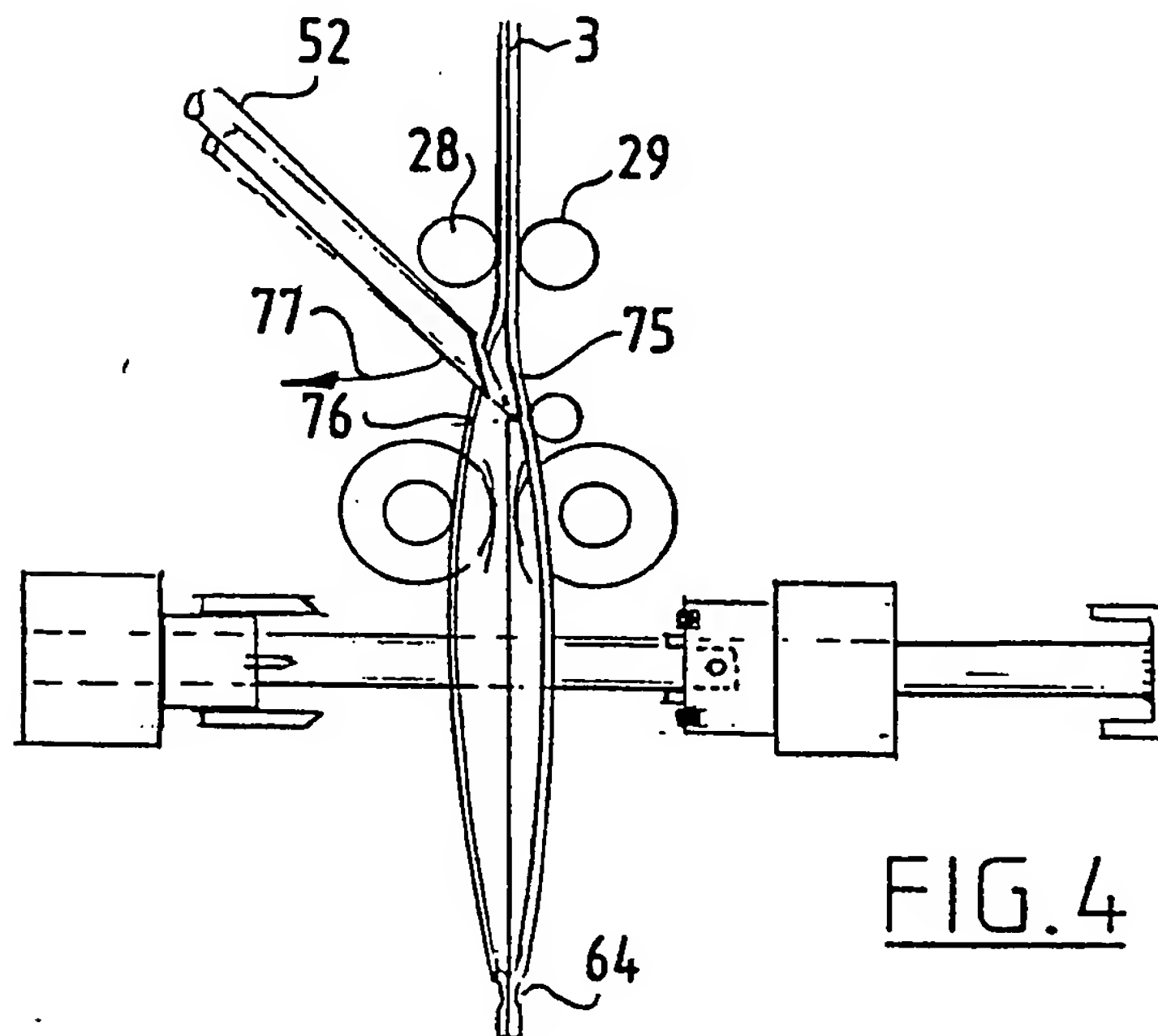
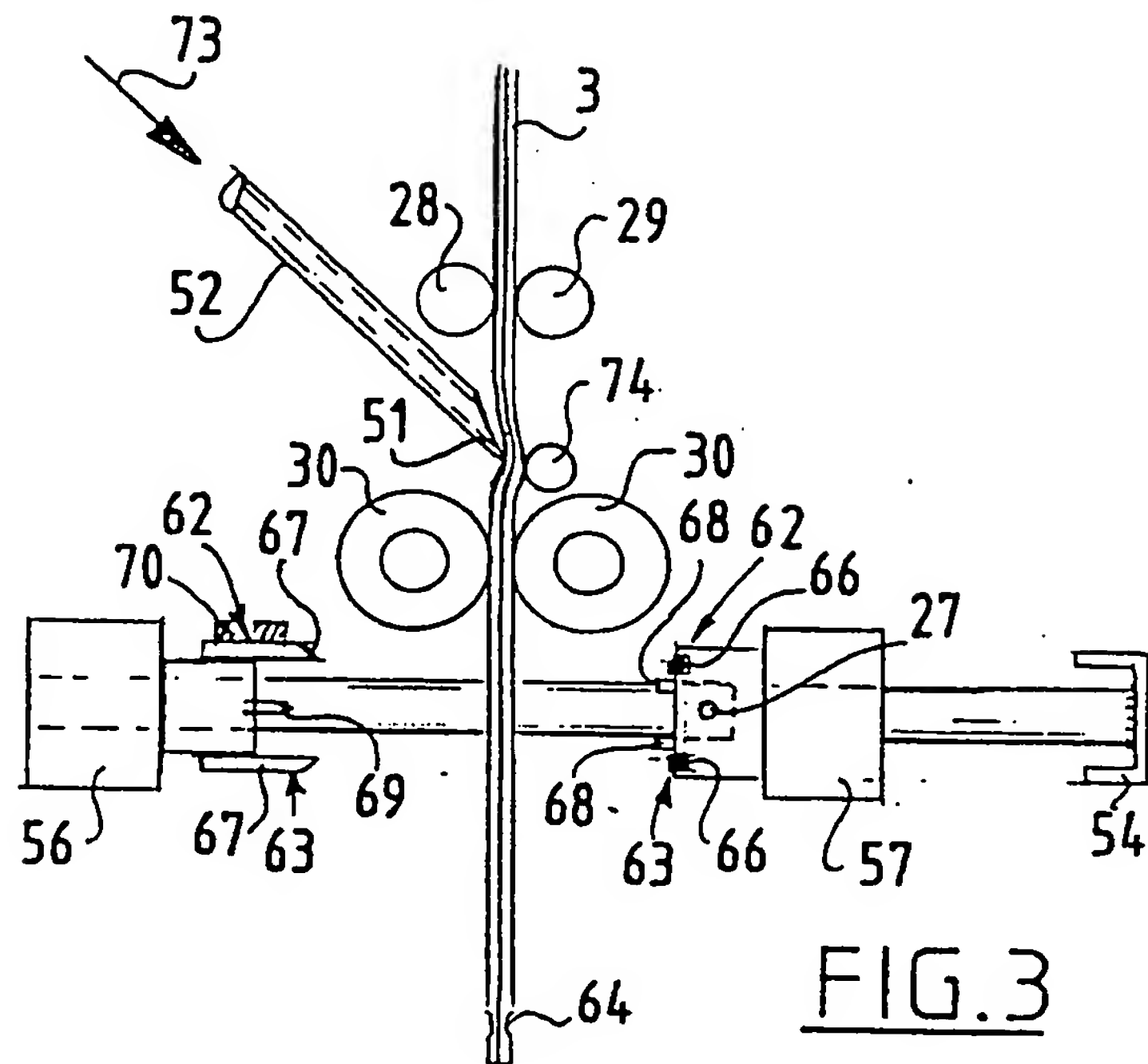


FIG. 2.



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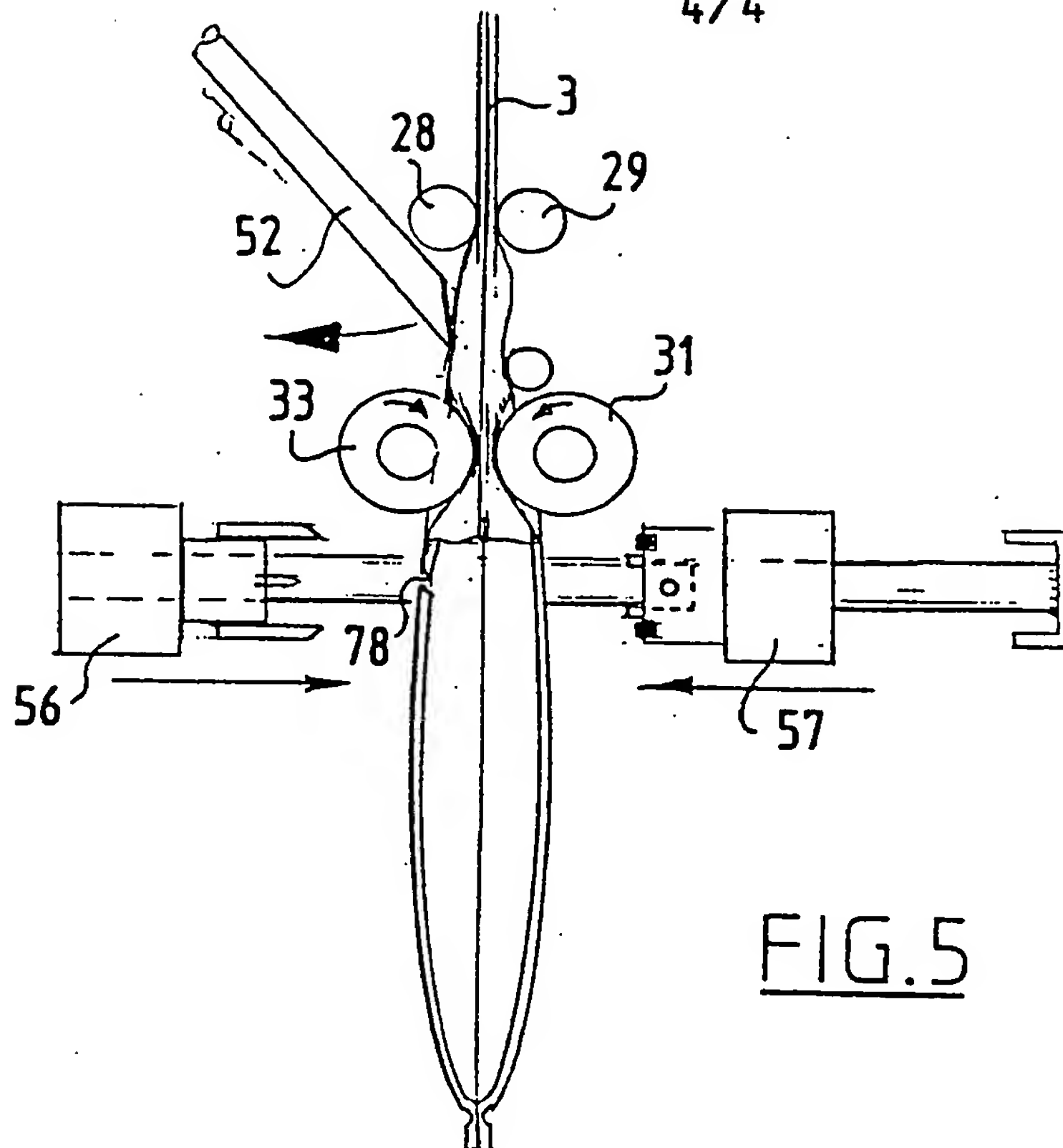


FIG. 5

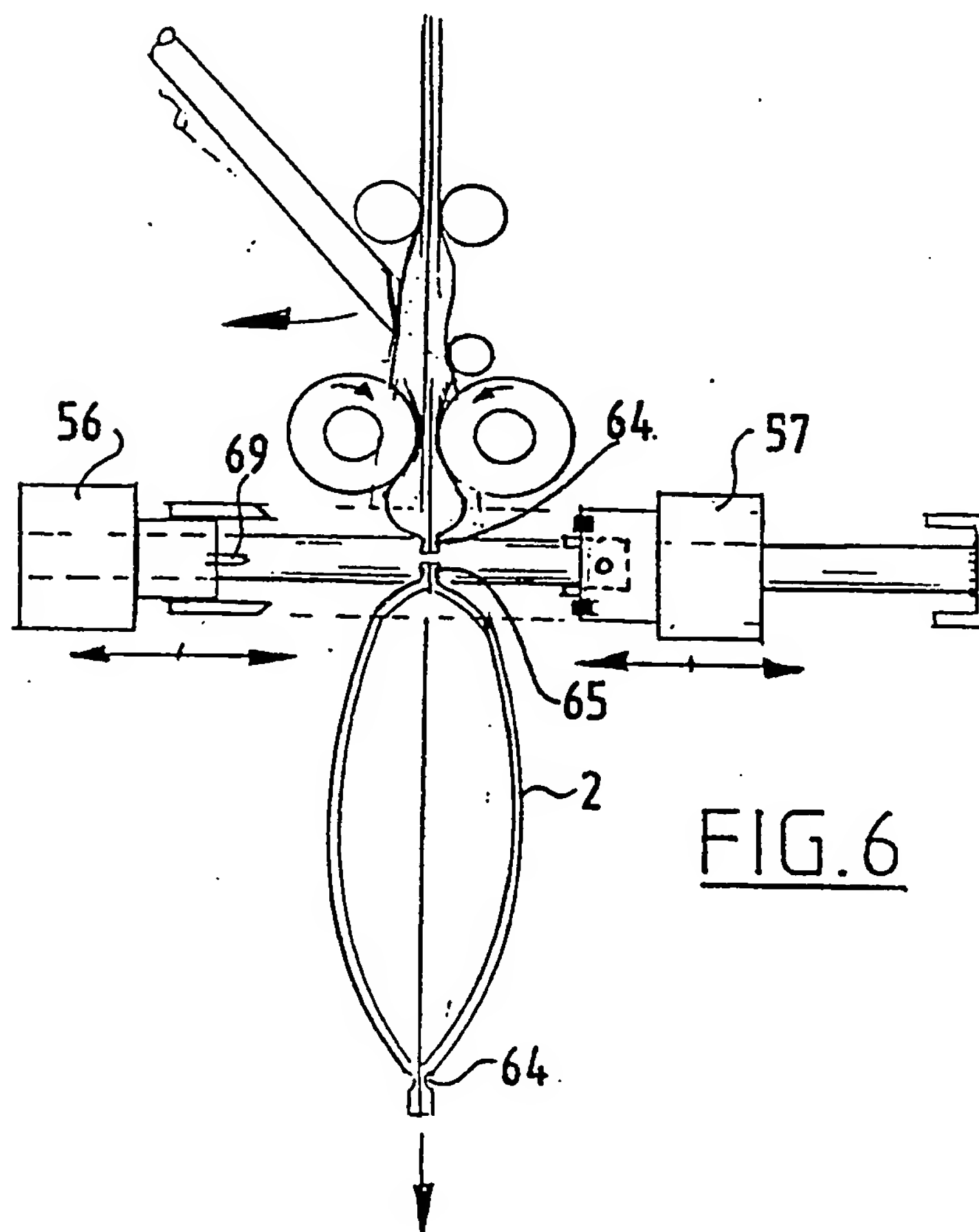


FIG. 6

INTERNATIONAL SEARCH REPORT

International Application No
PCT/NL 93/00194

A. CLASSIFICATION OF SUBJECT MATTER
IPC 5 B29C49/00 B65B9/13 B29C49/60

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 5 B29C B65B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO,A,91 12175 (B. PLATEAU) 22 August 1991 see the whole document ---	1-3,7-9
X	US,A,4 110 956 (WEISBERG) 5 September 1978 see figures ---	1
A	FR,A,2 580 597 (YAMASHIRO ET AL.) 24 October 1986 see page 7, line 8 - line 32 ---	1,2,6
A	US,A,4 384 442 (PENDLETON) 24 May 1983 see the whole document ---	1
A	FR,A,2 389 477 (COMPAGNIE FRANÇAISE DE RAFFINAGE) 1 December 1978 see figures ---	1
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Date of the actual completion of the international search

13 December 1993

Date of mailing of the international search report

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/NL 93/00194

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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US-A-2861406		NONE	

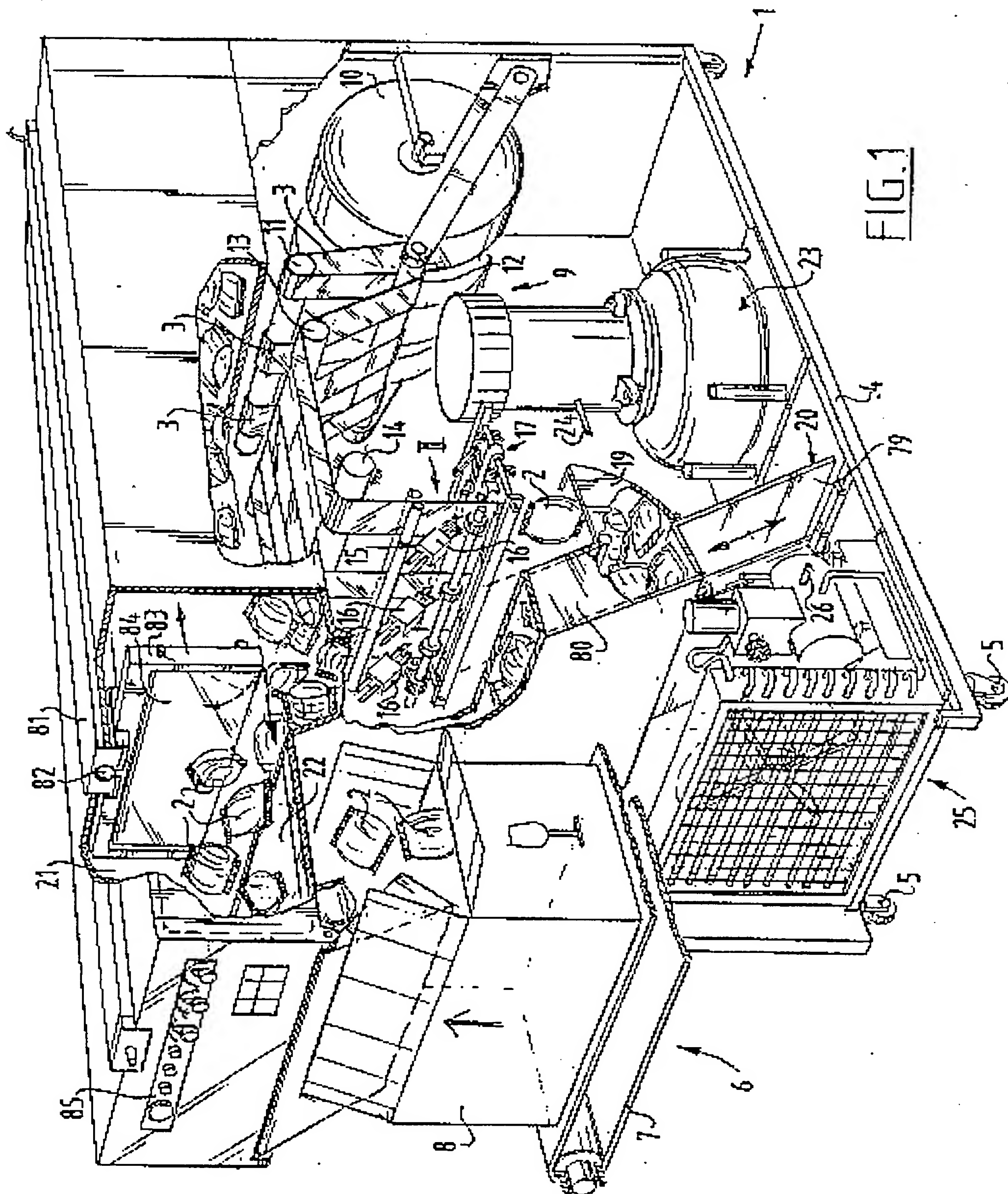
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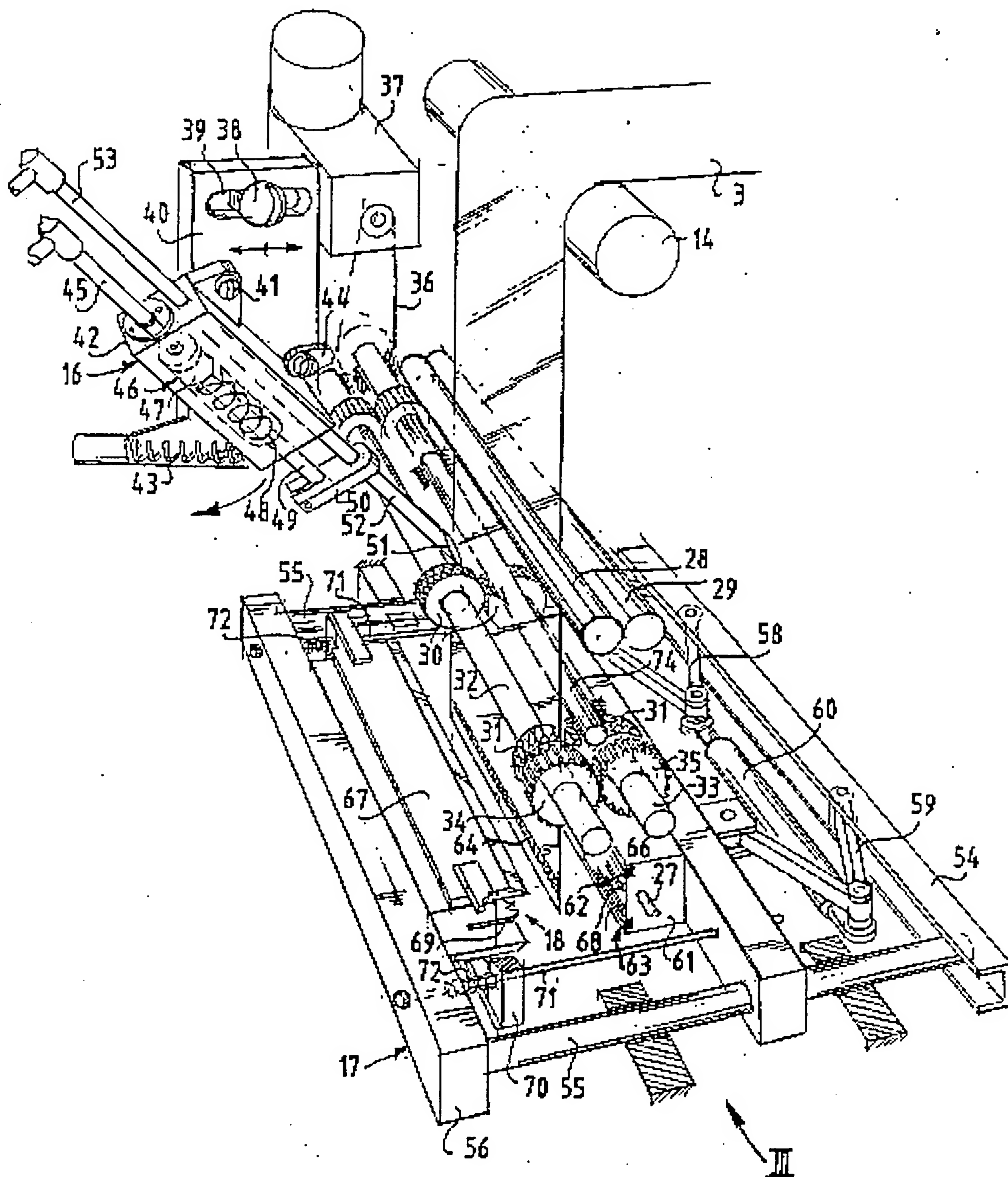
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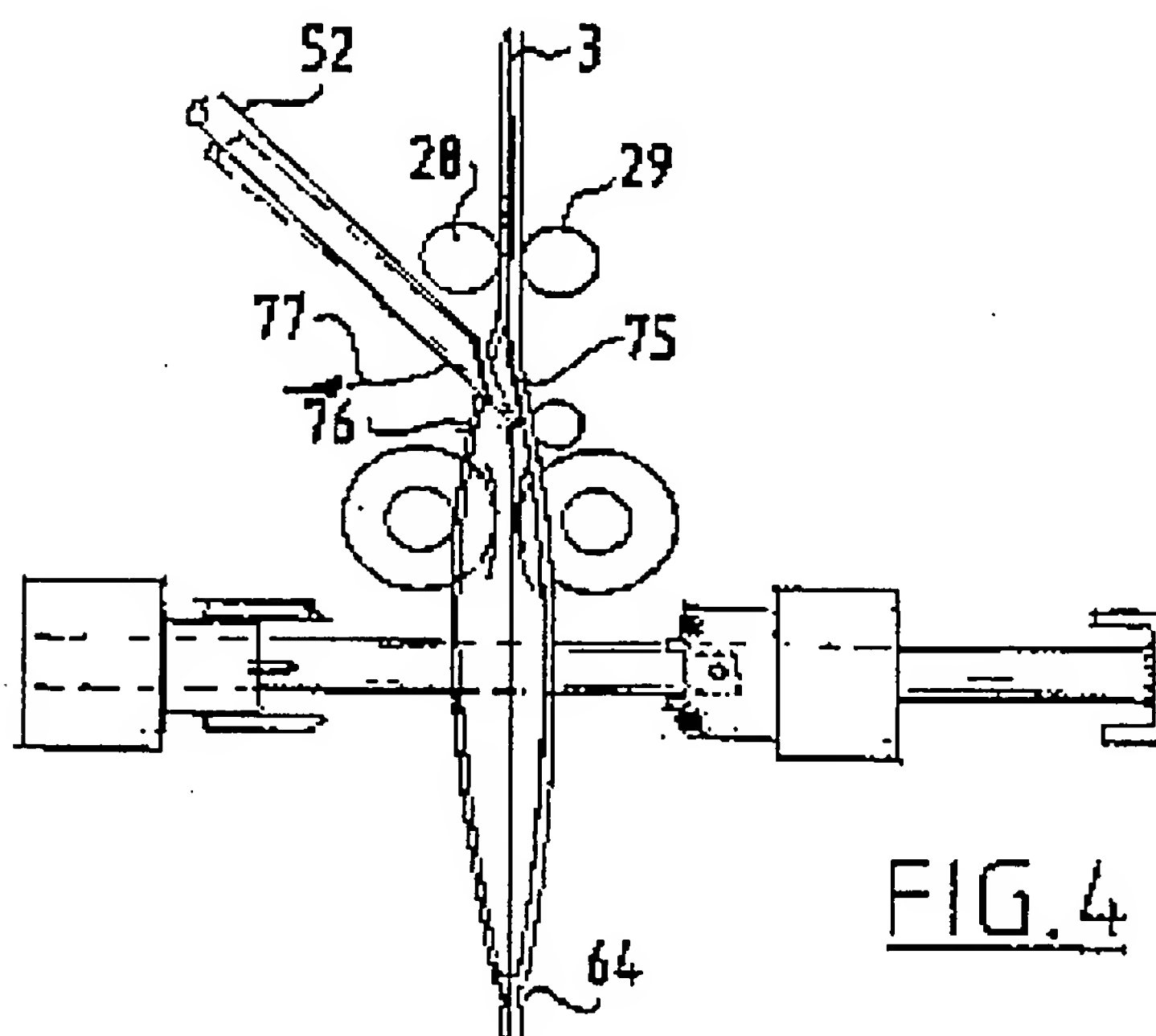
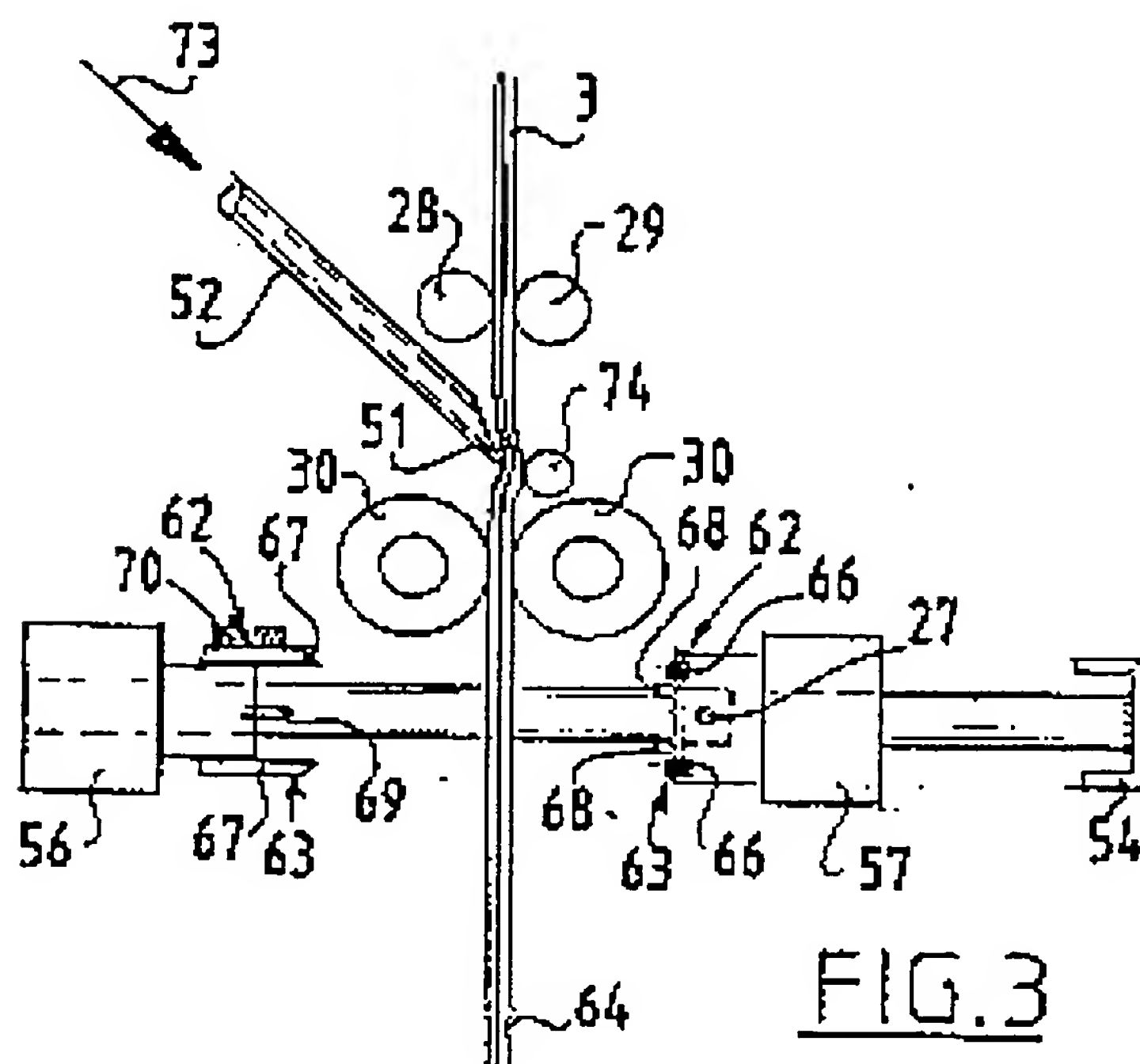
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	<p>US,A,2 861 406 (HOLSMAN ET AL.) 25 November 1958</p> <p>-----</p>	







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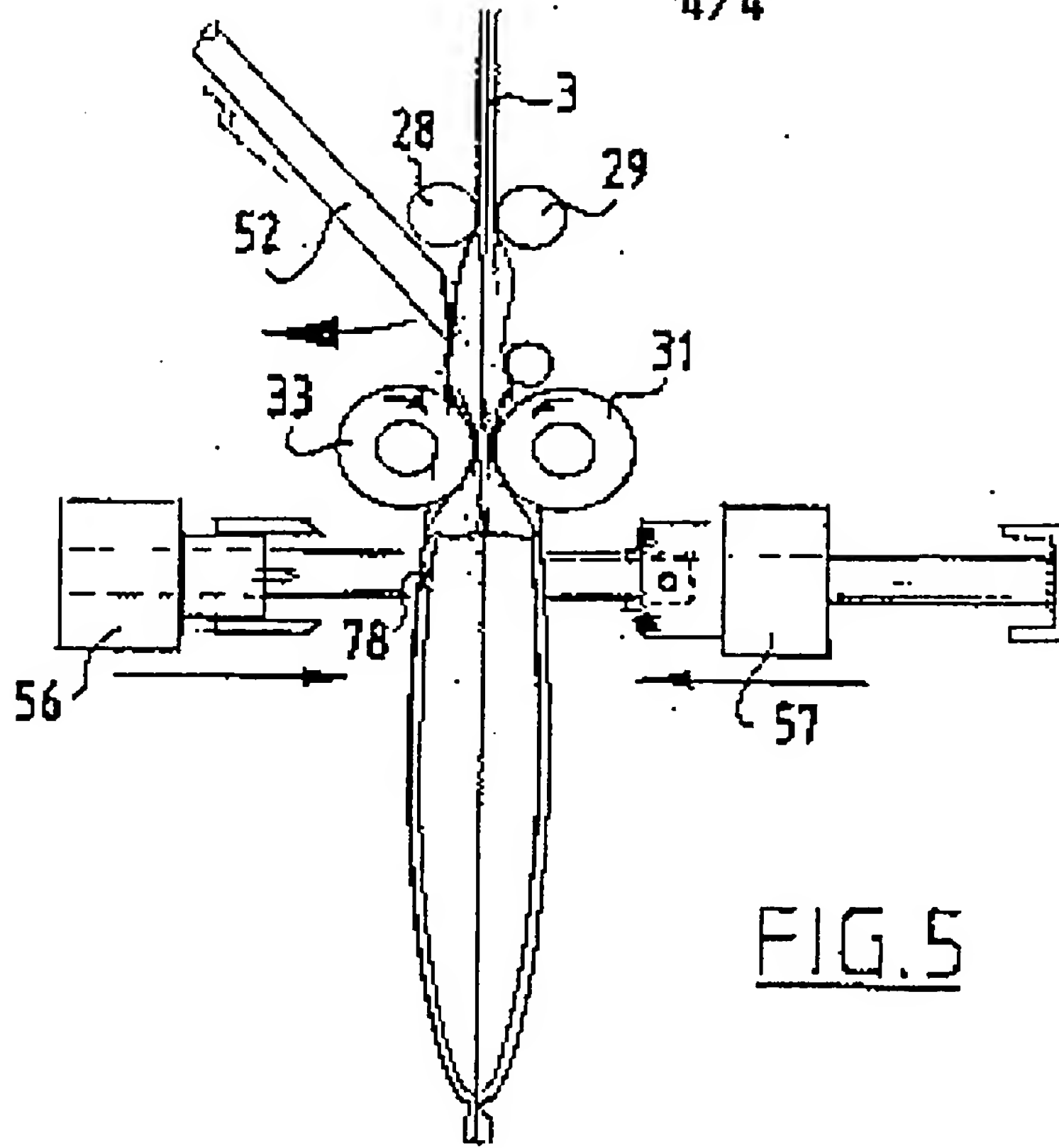


FIG. 5

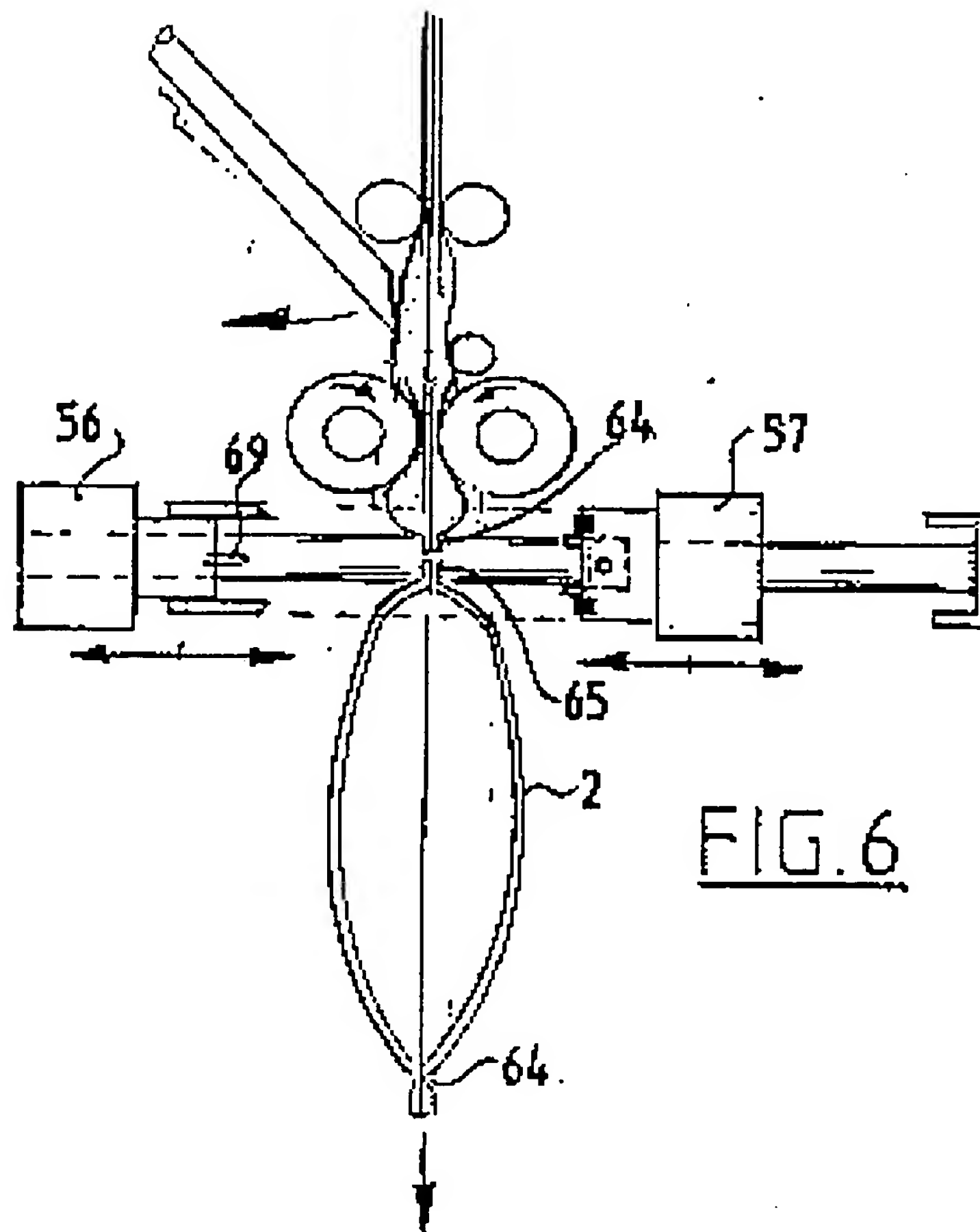


FIG. 6